MARCH 1991 VOLUME 6, NUMBER 3 $10 YEAR

SEATTLE AREA TIMEX/SINCLAIR USER GROUP NEWSLETTER

swqm

SEATUG MEETING

March 7, 1991
Thursday 7:30pm
University Federal Savings Bank
8517 35th Ave. NE, Seattle

IN THIS ISSUE

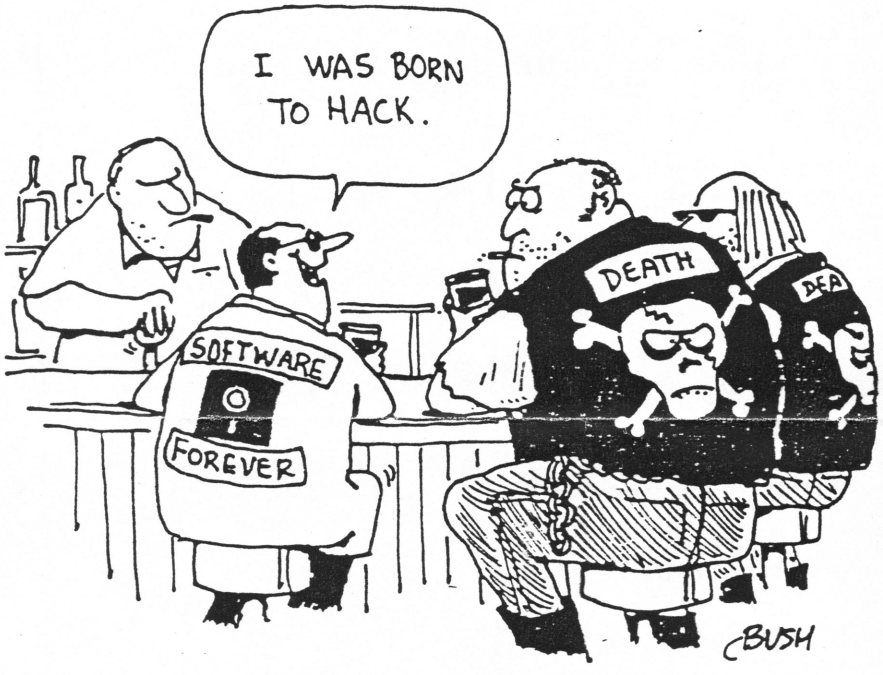
Minutes

QL Primer

swqm reprint

Random bits

Linked Lists & Recursions Part 2



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CONTENTS

MINUTES 4

Clockwatcher Malcolm Post tells all of the February meeting.

MAR 10 years ago this month 5

GROWTH PLANS and PAINS an interview with Nigel Searle

QL primer 7

Lottery program and BASIC listing Thanks Ken!

MINI-X-MOD and HotZ 12

Just like old times... Chuck Kereluck reminds us of our roots with a T/S 1000 article.

Linked Lists & Recursions Part 2 14

Dale Fritz completes his article with an explanation of Binary Tree storage.

Letters to the editor

Delemmas
Poke Problems
Abort,retry,fail
Tape load help

Could this be you?

Classifieds

Buy, sell, trade.

Remember: members can advertise free! So give us what ya'got to sell.

Next Month

EDITORIAL

HELP! Now that I have your attention, I'd like to ask all of the members of SEATUG to think about where we are going. What would you like to see the club do and accomplish this coming year? We have options, hardware projects for the T/S 1000 would be an easy one. I'd certainly donate some hardware and time to a worthy project. The club still hasn't decided on a direction. Is there still interest in those QL's we can procure for a good price? You all know what I'm into, electronic bulletin boards. How about a packet radio BBS project. That's one of my dreams. Any hams out there willing to help shove me in the right direction. I have the energy, but not the technical expertise. And again I'm willing to put in whatever time I can. So what do you think? Bring your ideas to the next meeting, ok?
Other things to think about...
Club picnic this summer.
Show and tell.
Your thought here!
I'd hate to see the club lose some of the wonderful members we have for lack of interest, but I feel if we don't act soon migration toward MS-DOS and other machines exclusively will be the trend. I can see it in myself and other members not to mention other clubs which are disbanding or forming MS-DOS user groups. Perhaps I'm beating a dead horse but I'd like to see our club thrive a while longer and if we do die out let us go out with a bang, and not a whimper.

till next month---Robert---

ATTENTION BASIC PROGRAMMERS

Z E B U

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SCHEMATICS : DRAFTING

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MINUTES WITH SEATUG

by Malcolm Post, Secretary

MINUTES OF THE TIMEX USERS GROUP
February 7, 1991

The meeting was called to order at 7:45 P.M. by President Derryck Turner. There were ten members and one guest present.

The Treasurer's report showed that as of January 31, 1991 there was a balance of $264.97. This includes the interest for 1990. There are several bills outstanding pertaining to the publication of the news letter.

The increased size of the newsletter and the new higher cost for postage brought up, again, whether we should mail newsletters to all members and those going outside the local area or should we distribute the newsletter to those at the meeting and mail only the balance. It was mentioned that if the newsletter was received before the meeting, it was a good reminder of the forth-coming meeting date. The decision was made to continue mailing to all and to get the lower postal rate for printed matter and possibly reduce the size of the publication slightly.

Derryck picked up the kit for the Oliger disk interface from John. The question of price for the kit had not been resolved. A telephone call to John indicated a price higher than the club was willing to pay at this time. Robert volunteered to loan the club one of his interfaces for the time being. Pat volunteered to make up the cable needed to go between the control and the disk drives.

A letter has been received from Gil Parrish of Beggs, OK. requesting information on other Timex/Sinclair user groups that might be closer to him. He also sent a check requesting a copy of our Program Library List.

Dale informed us that Jack Dohany is out of business as of January 1, 1991 and will accept no orders or telephone calls pertaining to his former business with Sinclair/Timex products. There may be some other vendors who still have some of Jack's products. Dale reported that he received a large box of tapes from Robert and he has found there were a number of good ones that were not previously in the clubs library, so he has added them. Dale also showed us an interface card that he had purchased for his 2068 to emulate the Spectrum.

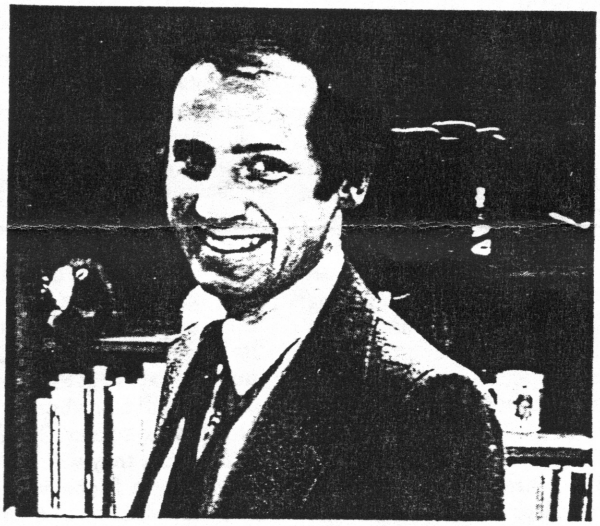
Dave told us that the Sears Lakewood store has 13" color TV/Monitors for $169.00 that are good product. They are being reduced in price because they are not cable compatible.

Our guest Michael Cline had called Derryck to find out if he knew how he might use his Amiga to emulate a Spectrum. (There is a Spectrum emulator available for the Amiga.) Derryck suggested that Michael attend our meeting and bring up the question there so that he could get more input. It was suggested that a better solution might be to get the Spectrum board for his 2068.

The meeting was adjourned at 9:49. Michael then showed some programs he had developed for the 2068. They included a color display of 8 foreign flags and a program called Cave. He also pointed out a "bug" in the ROM of the 2068.

Respectfully submitted,
Malcolm Post, Secretary

Growth Plans and Pains
An Interview with Nigel Searle



Nigel Searle is Sinclair's man in Boston. He is responsible for operations in the United States and Canada of Sinclair Research Ltd.

Recently Mr. Searle visited Creative Computing and spoke with publisher David Ahl, about the future plans for the American operations of Sinclair.

N.S.: As a general plan I would like to see us explore one new market every six month period. I think that in four or five months just about anybody who is thinking about buying a personal computer (which is to say the reasonably technically oriented people, the same sort of people who have already bought computers) must be aware that there is an option of only spending a couple hundred dollars to get started. Market awareness is very high.

By the middle of 1981 I would like to achieve a similar level of awareness among people who make either purchasing decision or recommendations regarding computers to be used in schools. Simultaneously, we will focus our own mail-order efforts on the home educational aspects of computers in an attempt to reach beyond the technical audience. Any parent who is thinking of buying a computer for his children will know that there is a low-cost entry point. and will not have heard only of Apple and TRS-80.

It is surprising how many teachers there are who read only educational publications. Even though they may teach math or computing, they don't read the computer publications. At this point these teachers are totally unaware of the fact that there is such a thing as the ZX-80, and will remain ignorant unless we do something about that by addressing them through the appropriate channels.

My target for the first half of 1981 is to achieve a level of awareness in the educational market. We would like to find a single distributor who is capable of handling this market with relatively little support from us other than the product. We would share all the knowledge we have gained from our experience in other markets. but we are hoping to achieve a rate of growth that will be just about impossible to do on our own.

The negotiations that we are having at the moment don't look overly promising and I don't want to suggest that anything is going to happen soon. I believe that traditional publishing companies would make the best kind of partners for the educational market because of they are already selling to schools. They have the sales force to do the job. They have the ability to produce and publish the collateral material, software etc. And like most publishers they realize that their future lies not only in ink and paper. The problem is that their sales force is not necessarily experienced in selling hardware. But you must compromise somewhere.

D.A.: What arrangements do you have with Image Software?

N.S.: What we are selling there is our computer plus Image Computer Products' Computer Learning Lab as a single package. Our ads in the non-technical publications next year are going to go very strongly on this theme: selling the benefit of in-home education, rather than selling the product itself as we do now to the technical audience.

It does no good to tell someone who does not know what a computer is, that he needs a computer. You've got to tell him what it will do for him. Then he will understand. If you are advertising in *Popular Electronics*, the readers already know what a computer can do for them; they want to know what this particular product is. But for the wider, non-technical market you have to detail the benefits. I think that in a year most of our mail-order ads, for whatever market—technical or nontechnical—aren't going to look very much like ads for hardware. They will look like ads for software, because all the emphasis will be on applications.

D.A.: That's where we are now with our magazine positioning: it's applications and software. We think that eventually there is a much bigger market for that than for

Searle Interview, continued...

the hardware oriented magazine.

From a competitive standpoint, what do you think the impact will be of the new Commodore VIC: a four-color, 5K memory computer with lots of capability for only $300?

N.S.: It is obviously a much keener competitor than anything that exists at the present time. But we're not going to stand still. One of the amazing things to me is that we have sold as many computers as we have, when all we offer is Integer Basic and 1K bytes of RAM. Within a few months, I hope we will have the 16K RAM and the 8K Basic, which will greatly expand our market.

We feel that we are in a strong position to respond to competition. If Commodore were talking about a $200 price point for the VIC, then I would be more worried than I am. I think they will offer more competition than anyone else in the market at the moment. But I don't think we are going to have much difficulty in saying, "Here's our machine. Here's Commodore's. Look at the difference in price and look at the difference in functions, and about the only thing extra you get from Commodore is color."

D.A.: What about some of the newer Japanese entries? Are there any on the horizon that look like competition?

N.S.: The amazing thing to me, again, is that I don't see any signs from anyone other than Commodore that they are interested in the really low end of the business. I don't know why Commodore is the only company that has shown interest. Perhaps this is because it hasn't, in general, been doing very well here in the states. Therefore it has nothing to lose; it's not going to lose high-end sales by selling a low-end machine.

We have proved that a market exists. Our sales are sufficiently high that we have discussed an advertising strategy calling ourselves "The World's Number 1 In Personal Computers." This means that Sinclair has sold more personal computers than any other company—even when you include the models of all the other companies. Frankly, I am not in any hurry to make that claim, nor is Clive Sinclair. We kind of like the fact that nobody else yet seems convinced that a big market exists. The longer they remain unconvinced, the better I like it.

D.A.: You mentioned the 16K memory and 8K Basic. Are they two separate plug-ins?

N.S.: The 8K Basic is a single chip which takes the place of the 4K chip on the main board. You simply remove the cover, take out the 4K chip and plug-in the 8K chip. The 16K memory module plugs in to the connector on the back of the board. It is in a small case about 2 1/2" square.

D.A.: Do you have any projected prices on those two?

N.S.: The 16K RAM will be $99.95. The 8K Basic almost certainly will be $39.95.

D.A.: I know no one likes to talk about pricing, because you never know where things will end up, but if competition heats up substantially, would you meet it with price or with something else?

N.S.: I don't mind talking about it. We buy our components from the same people that everyone else does. If you are engaged in a price war, then you have to be very smart in your design, and you have to be smart in your buying. You've also got to be very careful that you don't build at yesterday's prices and sell at tomorrow's prices. I hope that we at Sinclair have learned something from being in the calculator business and that we will be better equipped to cope with that sort of downward spiral of prices if it turns out that way.

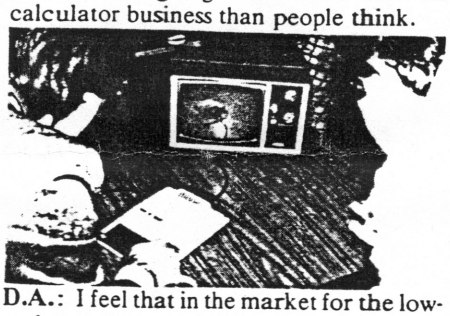
I am probably more pessimistic about that happening than are most people in the business. I don't think the personal computer, once it becomes a truly consumer-oriented item, is going to be very different from the calculator in terms of its marketing. Features will count for almost nothing except at the initial stage. All that anyone will care about is that they get the cheapest computer. Because they are dead scared that they will buy one for $50 and tomorrow a friend will buy one for $35 and they will feel like an idiot. That is all that motivated the drive in calculator prices down to $29.95 and then $19.95.

There eventually emerges a price that people are willing to pay and they want the best you can give them at that price. If they can get everything they want then they don't want to pay more than that critical price. I think we are well equipped to buy components to design the product using our experience with the calculator business. I think we are well equipped to survive that kind of price war and, hopefully, we are smart enough to look ahead to see what kind of product we will need afterward to compete with the Japanese—if indeed it is the Japanese who come along afterward as they did in the calculator business.

The other thing about the calculator business that may be true for the computer business is that there came a time at various stages in the calculator business where you couldn't sell a calculator unless it was of a particular type. I have said that people weren't feature conscious, but they were in a very unselective, media-directed way. There were articles about how to buy a calculator—they would say "do not buy a calculator with disposable batteries, it must have an A/C adaptr and recharger." That remained true for quite a long time until Rockwell brought out the first calculator that ran off a single nine-volt battery. It was far superior to a rechargable battery system.

But because people were told not to buy a throw away battery system because "they will run down in no time at all and will cost you a fortune" people still believed that to be true even when they had a single nine-volt battery unit available to them. Then there was a time you couldn't sell a calculator unless it had a percentage key, or a memory key on it. Despite the fact that of all the people who bought calculators with a memory key only 2.5% used them, no one would buy one that didn't have a percentage key; they read in *Consumer Reports* that you should have one.

It is dangerous to say that the computer business is going to be just like the calculator business. It will be different, and it is probably pointless to make comparisons with other products and other markets. It is, however, going to be more like the calculator business than people think.



D.A.: I feel that in the market for the low-end computer—not just the Sinclair, but the VIC, Mattell, APF etc.—a big mistake is being made in trying to initially sell the broad consumer market. The best market for these products is made up of people who already have a computer—those who have bought an Apple, Altair etc. — and don't want their kids playing with it all the time. Or they want a state-of-the-art unit for themselves.

N.S.: Absolutely. In a sampling of thd people who bought our computer from an ad in *Popular Electronics*, 38% already owned a personal computer. But, obviously, in the long run we do not want to sell exclusively to people who already own a personal computer, because then we can only sell as many units as all other manufacturers put together.

D.A.: My point is that I believe a computer is still a new enough device that someone buying it wants a recommendation from someone else who has one.

N.S.: Perhaps. But there may be another way. You can't convince a large part of the market until they have actually used the machine. Our consumer market advertising within the next couple of months will start to go on the attack. Rather than hide our free trial offer, money-back guarantee in the fine print, we will put it right up front. So much up front that it might well be the headline. We've been kicking around ideas at the advertising agency with lines such as "You can't try the Sinclair for 10 minutes in any store, but you can try it for 10 days in your own home at no cost." Just using the old fashioned mail-order ploy that says "Please, please, take one and try it. If you don't like it send it back. But please try it." We think that trying it will convince the customer to buy it. □

Last month I said we would try to win the lottery with this issue. A few years ago I started to write programs to do just that! In fact, the only reason I have extra memory and disc drives today is because of my obsession with winning Oregon's lottery. I had so much data that it wouldn't fit in 128K. When I bought this machine I thought moving from 2K to 128K (TS1000 to the QL) would forever end the "OUT OF MEMORY" message for me. This is before I wrote over 150K of programs and data to analyze and manipulate the vast number of variables involved. Don't worry, I'm not going to have you type in all my past mistakes! We're just going to deal with the programs that have the best probability of increasing our odds of winning the lottery.

Now for you purists out there, I do realize there is no possible way of predicting the winning numbers. However, as in all games of chance there are ways to improve your odds. These are the areas I pursued for over two years. In the end I had a workable system that hit 4 number matches 26 times and 5 number matches twice in the period of a year. The net result was I could play the lottery with no "out of pocket" money. I had "stumbled" on to a system that had a very slight positive cash flow which would allow me to play until my numbers finally came up. Or so I thought! You see, Oregon had the easiest lottery at the time. One only had to hit 6 out of 42 numbers. Then they decided that it was to easy and changed the odds to about twice what they were. Shortly thereafter I moved to Washington and haven't been able to get back to working on these programs. Maybe some of you have more spare time to work on this project.

I wrote several programs to analyze the past winners to pick the "hottest" numbers, but these only seemed to work with the 6 out of 42 lottery. These involved finding out how many times a particular number had hit, how long it has been since it hit, and how many times it has gone this long and hit again. In other words lets take the number 15 for example. The analyze program would tell me that it has hit 67 times since the game began. It has been 8 weeks since it has hit, and it has skipped 8 weeks then hit 9 times before. It's interesting that numbers start to form a pattern that you can actually visualize on a chart. Say the same number has never hit after skipping 7 weeks, well then it would probably be a better bet to pick that number 8 weeks after it hit rather than 7. When you consider all the numbers you can see how it can get to a point where you need extra memory. Also numbers tend to hit within 5 weeks since they've hit before. Don't ask me why this happens since the odds are equal for all numbers every week. If you take the numbers that hit this week then go back 5 weeks you will find that usually 70% of these numbers have hit in that period. So what all this means is that once you have all the data in tables you can "weight" them to your choosing and hopefully increase your odds. I would start with the number of times hit, so if the number 15 had hit 67 times number 15 would equal 67. Then I would add extra points if 15 has hit in the last 5 weeks, and even more points if it has hit on the 8th week. I won't disclose my exact point method since this would create a problem in that everyone using the system would be choosing the same numbers. But this is pretty much the system that I used.

After the numbers were assigned point values they would be sorted in descending order then the top 12 were wheeled into 6 sets of 6 and these are the numbers that I would play. For those of you that are not familiar with wheeling, it is commonly used in Reno or Vegas for increasing odds in the game Keno (which is very similar to Lotto). It is a system of combining numbers to cover all possibilities. In my case I used a 12/6/4/6 system so I picked 12 numbers and made 6 combinations of these 12 to cover all of the possible 4 number combinations. What this boils down to is, if the 6 numbers picked this week are within the 12 I picked (or had the computer pick for me) I would be guaranteed at least a four number match. This was usually in the $26 neighborhood but with only $3 invested it works out pretty well!

Think about it, wouldn't you have a better chance if you could pick 12 numbers rather than 6? Of course! This is the whole idea with wheeling numbers. There are several wheel combinations that you can use, but the 12/6/4/6 is the "poor mans" wheel. Other wheels I used include 11/26/5/6, 12/42/5/6, and 18/42/4/6. The 11/26/5/6 and 12/42/5/6 wheels guarantee a 5 number match but cost 13 and 21 dollars respectively. When you consider that a 5 number match pays between 6 and 14 hundred dollars these are not bad bets either. As you've figured out by now the first number in a wheel system is the number of numbers you can pick and the second is the number of combinations. The third number is the guaranteed match and the fourth number tells you how many of the numbers that you pick have to match the ones drawn. So a 12/6/4/6 wheel means that you pick 12 numbers and these are wheeled into 6 combinations. You are guaranteed a 4 number match if all 6 numbers picked match 6 of the 12 you picked. A 14/40/4/5 wheel lets you pick 14 which are wheeled 40 ways and guarantees a 4 number match if only 5 of the numbers picked match 5 of the 14 you picked. There are all kinds of wheel systems. How would you like to be able to pick 20 numbers and have them covered? Well you could use the 100/20 wheel, but it only guarantees a 4 number match and costs $50 dollars to play. Keep in mind that these prices are considering you get two plays for a dollar. If your lottery only gives you one set of numbers for a dollar move to another state! <Grin>.

I'm sorry if I seem to be rambling on but I wanted to be sure that you understand the principles behind wheeling systems. If you still have any questions there are several good books in your local library that will explain wheel and betting systems better than I. So with that out of the way, let's get to the meat of this installment. We are not going to get into the analyzing programs at this time. If you want to drop me a line in care of the Editor and show any interest I will go into them later. Instead I will put together a program that will allow you to wheel the numbers that you pick yourself. I tried to write this program as clear as possible to insure a "use friendly" package. My programming i usually "quick and dirty" but i works!

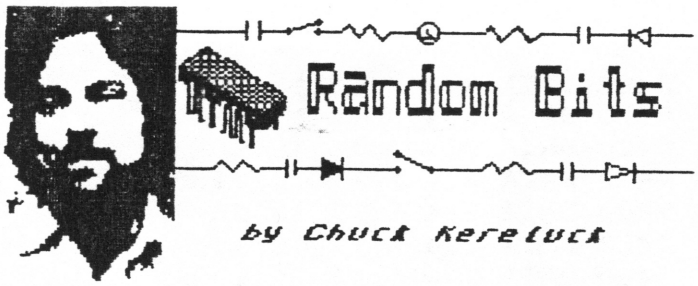
There is an option to print you numbers out to a printer and one t make a disc (or microdrive) file. I you choose N (no) on both of these i will just print to the screen so yo can copy them down from there. I use the file when I was playing larg wheel systems so the computer coul check for winners. Going through 10 lottery tickets gets pretty boring Other than that the program is prett self explanatory. So have at it and hope you win your lottery soon!

```
10 OPEN #1,con_512x206a0x0:CLS:CLS#0
20 wheel_menu
30 CLS
40 AT 10,25
50 INPUT "Would you like to wheel some
   more? ";q$
60 IF q$=="y" THEN GO TO 20
70 STOP
100 REMark*****************************
110 DEFine PROCedure wheel_menu
130 CLS
140 PRINT \,TO 25,"****WHEEL MENU****
150 PRINT FILL$("_",80)
160 PRINT \\,"Press 1 for 11/26/5/6"
170 PRINT TO 19,"2 for 12/6/4/6
180 PRINT TO 19,"3 for 12/42/5/6
190 PRINT TO 19,"4 for  14/40/4/5
200 PRINT TO 19,"5 for  16/38/4/6
210 PRINT TO 19,"6 for  18/42/4/6
220 PRINT TO 19,"7 for  20/100/4/6
240 LET r=INKEY$(-1)
250 SELect ON r
260 ON r=1:x=26:y=11
270 ON r=2:x=6:y=12
280 ON r=3:x=42:y=12
290 ON r=4:x=40:y=14
300 ON r=5:x=38:y=16
310 ON r=6:x=42:y=18
320 ON r=7:x=100:y=20
340 GO TO 400
350 ON r=REMAINDER
360 PRINT "Invalid response/try again'
370 GO TO 130
380 END SELect
390 process
400 END DEFine wheel_menu
410 REMark*****************************
420 DEFine PROCedure process
425 CLS:AT 10,10:PRINT "Computing...."
430 DIM a(x,6)
440 DIM b(y)
```

```
450 DIM c(x,6)
460 DIM d(6)
470 LET e=0
480 FOR i=1 TO 6
490 LET d(i)=e+4
500 LET e=e+4
510 NEXT i
520 RESTORE r*1000
530 FOR i=1 TO x
540 FOR j=1 TO 6
550 READ a(i,j)
560 NEXT j
570 NEXT i
575 CLS
580 FOR i=1 TO y
590 PRINT "Pick no. ";i;" ";
600 INPUT b(i)
610 NEXT i
620 CLS
625 AT 10,10:PRINT "Computing....."
630 FOR i=1 TO x
640 FOR j=1 TO 6
650 LET c(i,j)=b(a(i,j))
660 NEXT j
670 NEXT i
680 INPUT \\,"Hard copy- Y/N? ";z$
690 INPUT \,"Disc file? ";x$
700 IF z$=="Y" THEN hard_copy
710 IF x$=="Y" THEN file
720 LET w=1:CLS:PRINT \\
730 FOR i=1 TO x
740 FOR j=1 TO 6
750 PRINT TO (d(j)),c(i,j);
760 NEXT j
770 PRINT
780 LET w=w+1
790 IF w>=17 THEN
800 PRINT #0,"Press any key to see
    next screen."
805 dummy$=INKEY$(-1)
810 LET w=1
830 CLS:CLS#0:PRINT \\:NEXT i
840 END IF
850 NEXT i
860 PRINT \\,"When done hit any key"
870 PAUSE
880 END DEFine process
890 REMark*****************************
900 DEFine PROCedure hard_copy
910 OPEN #3,ser1
920 FOR i=1 TO x
930 FOR j=1 TO 6
940 PRINT #3,TO d(j),c(i,j);
950 NEXT j
960 PRINT #3
970 NEXT i
975 END DEFine hard_copy
980 REMark*****************************
982 DEFine PROCedure file
984 DELETE "flp2_pdata_"&a1&"_"&a2
9  8  6       O  P  E  N  _  N  E  W
#4,"flp2_pdata_"&a1&"_"&a2
988 PRINT #4,a1
990 FOR i=1 to a1
992 FOR j=1 to 6
994 PRINT #4,c(i,j)
995 NEXT j
996 NEXT i
997 CLOSE #4
998 END DEFine file
999 *******DATA STARTS HERE*********
1000 DATA 1,2,4,5,6,7
1010 DATA 1,2,4,5,10,11
1020 DATA 1,2,4,6,9,11
1030 DATA 1,2,4,7,9,10
1040 DATA 1,2,5,6,8,11
1050 DATA 1,2,5,7,8,10
1060 DATA 1,2,6,7,8,9
1070 DATA 1,2,8,9,10,11
1080 DATA 1,3,4,5,6,11
1090 DATA 1,3,4,5,7,10
1100 DATA 1,3,4,6,7,9
1110 DATA 1,3,4,9,10,11
1120 DATA 1,3,5,6,7,8
1130 DATA 1,3,5,8,10,11
1140 DATA 1,3,6,8,9,11
1150 DATA 1,3,7,8,9,10
1160 DATA 2,3,4,5,8,9
1170 DATA 2,3,4,6,8,10
1180 DATA 2,3,4,7,8,11
1190 DATA 2,3,5,6,9,10
1200 DATA 2,3,5,7,9,11
1210 DATA 2,3,6,7,10,11
1220 DATA 4,5,6,8,9,10
1230 DATA 4,5,7,8,9,11
1240 DATA 4,6,7,8,10,11
1250 DATA 5,6,7,9,10,11
2000 DATA 1,2,3,4,5,6
2010 DATA 1,2,3,7,8,9
2020 DATA 1,2,3,10,11,12
2030 DATA 4,5,6,7,8,9
2040 DATA 4,5,6,10,11,12
2050 DATA 7,8,9,10,11,12
3000 DATA 1,2,3,4,5,6
3010 DATA 1,2,3,7,8,9
3020 DATA 1,2,3,10,11,12
3030 DATA 1,2,4,7,8,10
3040 DATA 1,2,4,9,11,12
3050 DATA 1,2,5,7,8,11
3060 DATA 1,2,5,9,10,12
3070 DATA 1,2,6,7,8,12
3080 DATA 1,2,6,9,10,11
3090 DATA 1,3,4,7,9,10
3100 DATA 1,3,4,8,11,12
3110 DATA 1,3,5,7,9,11
3120 DATA 1,3,5,8,10,12
3130 DATA 1,3,6,7,9,12
3140 DATA 1,3,6,8,10,11
3150 DATA 1,4,5,7,10,11
3160 DATA 1,4,5,8,9,12
3170 DATA 1,4,6,7,10,12
3180 DATA 1,4,6,8,9,11
```

```
3190 DATA 1,5,6,7,11,12
3200 DATA 1,5,6,8,9,10
3210 DATA 2,3,4,8,9,10
3220 DATA 2,3,4,7,11,12
3230 DATA 2,3,5,7,10,12
3240 DATA 2,3,5,8,9,11
3250 DATA 2,3,6,7,10,11
3260 DATA 2,3,6,8,9,12
3270 DATA 2,4,5,7,9,12
3280 DATA 2,4,5,8,10,11
3290 DATA 2,4,6,7,9,11
3300 DATA 2,4,6,8,10,12
3310 DATA 2,5,6,8,11,12
3320 DATA 2,5,6,7,9,10
3330 DATA 3,4,5,7,8,12
3340 DATA 3,4,5,9,10,11
3350 DATA 3,4,6,7,8,12
3360 DATA 3,4,6,9,10,12
3370 DATA 3,5,6,7,8,10
3380 DATA 3,5,6,9,11,12
3390 DATA 4,5,6,7,8,9
3400 DATA 4,5,6,10,11,12
3410 DATA 7,8,9,10,11,12
4000 DATA 1,2,3,4,5,6
4010 DATA 2,4,5,6,7,9
4020 DATA 1,2,3,4,7,9
4030 DATA 2,4,5,6,8,11
4040 DATA 1,2,3,5,7,8
4050 DATA 2,4,10,12,13,14
4060 DATA 1,2,3,5,9,11
4070 DATA 2,5,10,12,13,14
4080 DATA 1,2,4,8,9,11
4090 DATA 3,4,5,7,9,11
4100 DATA 1,2,5,6,8,9
4110 DATA 3,4,10,12,13,14
4120 DATA 1,2,6,7,9,11
4130 DATA 3,5,6,8,9,11
4140 DATA 1,2,10,12,13,14
4150 DATA 3,5,10,12,13,14
4160 DATA 1,3,4,5,8,11
4170 DATA 4,5,10,12,13,14
4180 DATA 1,3,4,6,7,11
4190 DATA 4,6,7,8,9,11
4200 DATA 1,3,4,6,8,9
4210 DATA 6,7,10,12,13,14
4220 DATA 1,3,10,12,13,14
4230 DATA 6,8,10,12,13,14
4240 DATA 1,4,5,7,8,9
4250 DATA 6,9,10,12,13,14
4260 DATA 1,4,10,12,13,14
4270 DATA 6,10,11,12,13,14
4280 DATA 1,5,6,7,8,11
4290 DATA 7,8,10,12,13,14
4300 DATA 1,5,10,12,13,14
4310 DATA 7,9,10,12,13,14
4320 DATA 2,3,4,7,8,11
4330 DATA 7,10,11,12,13,14
4340 DATA 2,3,5,6,7,11
4350 DATA 8,9,10,12,13,14
4360 DATA 2,3,6,7,8,9
4370 DATA 8,10,11,12,13,14
4380 DATA 2,3,10,12,13,14
4390 DATA 9,10,11,12,13,14
5000 DATA 1,2,3,4,5,6
5010 DATA 1,2,3,7,8,9
5020 DATA 1,2,3,10,11,16
5030 DATA 1,2,3,10,12,15
5040 DATA 1,2,3,10,13,14
5050 DATA 1,2,3,11,12,14
5060 DATA 1,2,3,11,13,15
5070 DATA 1,2,3,12,13,16
5080 DATA 1,2,3,14,15,16
5090 DATA 4,5,6,7,8,9
5100 DATA 4,5,6,10,11,16
5110 DATA 4,5,6,10,12,15
5120 DATA 4,5,6,10,13,14
5130 DATA 4,5,6,11,12,14
5140 DATA 4,5,6,11,13,15
5150 DATA 4,5,6,12,13,16
5160 DATA 4,5,6,14,15,16
5170 DATA 7,8,9,10,11,12
5180 DATA 7,8,9,10,13,14
5190 DATA 7,8,9,10,15,16
5200 DATA 7,8,9,11,13,15
5210 DATA 7,8,9,11,14,16
5220 DATA 7,8,9,12,13,16
5230 DATA 7,8,9,12,14,15
5240 DATA 7,8,10,11,13,16
5250 DATA 7,8,10,12,14,16
5260 DATA 7,8,10,12,13,15
5270 DATA 7,8,10,11,14,15
5280 DATA 7,8,11,12,13,14
5290 DATA 7,8,11,12,15,16
5300 DATA 7,8,13,14,15,16
5310 DATA 9,10,11,12,13,16
5320 DATA 9,10,11,12,14,16
5330 DATA 9,10,11,12,15,16
5340 DATA 9,10,11,13,14,15
5350 DATA 9,12,13,14,15,16
5360 DATA 10,12,13,14,15,16
5370 DATA 11,12,13,14,15,16
6000 DATA 1,2,3,4,5,6
6010 DATA 1,2,3,10,11,12
6020 DATA 1,2,3,16,17,18
6030 DATA 1,2,7,8,13,14
6040 DATA 1,3,7,9,13,15
6050 DATA 1,4,7,10,13,16
6060 DATA 1,4,8,11,15,18
6070 DATA 1,4,9,12,14,17
6080 DATA 1,5,7,11,13,17
6090 DATA 1,5,8,12,15,16
6100 DATA 1,5,9,10,14,18
6110 DATA 1,6,7,12,13,18
6120 DATA 1,6,8,10,15,17
6130 DATA 1,6,9,11,14,16
6140 DATA 2,3,8,9,14,15
6150 DATA 2,4,7,12,15,17
6160 DATA 2,4,8,10,14,16
6170 DATA 2,4,9,11,13,18
6180 DATA 2,5,7,10,15,18
6190 DATA 2,5,8,11,14,17
6200 DATA 2,5,9,12,13,16
```

```
6210 DATA 2,6,7,11,15,16
6220 DATA 2,6,8,12,14,18
6230 DATA 2,6,9,10,13,17
6240 DATA 3,4,7,11,14,18
6250 DATA 3,4,8,12,13,17
6260 DATA 3,4,9,10,15,16
6270 DATA 3,5,7,12,14,16
6280 DATA 3,5,8,10,13,18
6290 DATA 3,5,9,11,15,17
6300 DATA 3,6,7,10,14,17
6310 DATA 3,6,8,11,13,16
6320 DATA 3,6,9,12,15,18
6330 DATA 4,5,6,7,8,9
6340 DATA 4,5,6,13,14,15
6350 DATA 4,5,10,11,16,17
6360 DATA 4,6,10,12,16,18
6370 DATA 5,6,11,12,17,18
6380 DATA 7,8,9,10,11,12
6390 DATA 7,8,9,16,17,18
6400 DATA 10,11,12,13,14,15
6410 DATA 13,14,15,16,17,18
7000 DATA 1,2,3,4,5,6
7010 DATA 1,2,3,6,7,8
7020 DATA 1,2,3,6,9,10
7030 DATA 1,2,3,7,8,9
7040 DATA 1,2,3,7,8,10
7050 DATA 1,2,4,11,12,13
7060 DATA 1,2,4,11,14,15
7070 DATA 1,2,4,12,13,14
7080 DATA 1,2,4,12,13,15
7090 DATA 1,2,5,16,17,18
7100 DATA 1,2,5,16,19,20
7110 DATA 1,2,5,17,18,19
7120 DATA 1,2,5,17,18,20
7130 DATA 1,3,4,16,17,18
7140 DATA 1,3,4,16,19,20
7150 DATA 1,3,4,17,18,19
7160 DATA 1,3,4,17,18,20
7170 DATA 1,3,5,11,12,13
7180 DATA 1,3,5,11,14,15
7190 DATA 1,3,5,12,13,14
7200 DATA 1,3,5,12,13,15
7210 DATA 1,4,5,6,7,8
7220 DATA 1,4,5,6,9,10
7230 DATA 1,4,5,7,8,9
7240 DATA 1,4,5,7,8,10
7250 DATA 2,3,4,6,7,8
7260 DATA 2,3,4,6,9,10
7270 DATA 2,3,4,7,8,9
7280 DATA 2,3,4,7,8,10
7290 DATA 2,3,5,6,7,8
7300 DATA 2,3,5,6,9,10
7310 DATA 2,3,5,7,8,9
7320 DATA 2,3,5,7,8,10
7330 DATA 2,3,5,11,12,13
7340 DATA 2,3,5,11,14,15
7350 DATA 2,3,5,12,13,14
7360 DATA 2,3,5,12,13,15
7370 DATA 2,3,5,16,17,18
7380 DATA 2,3,5,16,19,20
7390 DATA 2,3,5,17,18,19
7400 DATA 2,3,5,17,18,20
7410 DATA 2,4,5,16,17,18
7420 DATA 2,4,5,16,19,20
7430 DATA 2,4,5,17,18,19
7440 DATA 2,4,5,17,18,20
7450 DATA 3,4,5,11,12,13
7460 DATA 3,4,5,11,14,15
7470 DATA 3,4,5,12,13,14
7480 DATA 3,4,5,12,13,15
7490 DATA 5,6,7,8,9,10
7500 DATA 6,7,9,11,12,14
7510 DATA 6,7,9,11,13,15
7520 DATA 6,7,9,12,13,15
7530 DATA 6,7,9,13,14,15
7540 DATA 6,7,10,16,17,19
7550 DATA 6,7,10,16,18,20
7560 DATA 6,7,10,17,18,20
7570 DATA 6,7,10,18,19,20
7580 DATA 6,8,9,16,17,19
7590 DATA 6,8,9,16,18,20
7600 DATA 6,8,9,17,18,20
7610 DATA 6,8,9,18,19,20
7620 DATA 6,8,10,11,12,14
7630 DATA 6,8,10,11,13,15
7640 DATA 6,8,10,12,13,15
7650 DATA 6,8,10,13,14,15
7660 DATA 7,8,10,11,12,14
7670 DATA 7,8,10,11,13,15
7680 DATA 7,8,10,12,13,15
7690 DATA 7,8,10,13,14,15
7700 DATA 7,8,10,16,17,19
7710 DATA 7,8,10,16,18,20
7720 DATA 7,8,10,17,18,20
7730 DATA 7,9,10,18,19,20
7740 DATA 7,9,10,16,17,19
7750 DATA 7,9,10,16,18,20
7760 DATA 7,9,10,17,18,20
7770 DATA 7,9,10,18,19,20
7780 DATA 8,9,10,11,12,14
7790 DATA 8,9,10,11,13,15
7800 DATA 8,9,10,12,13,15
7810 DATA 8,9,10,13,14,15
7820 DATA 10,11,12,13,14,15
7830 DATA 11,12,15,16,17,20
7840 DATA 11,12,15,16,18,19
7850 DATA 11,12,15,17,18,20
7860 DATA 11,12,15,17,19,20
7870 DATA 11,13,14,16,17,20
7880 DATA 11,13,14,16,18,19
7890 DATA 11,13,14,17,18,20
7900 DATA 11,13,14,17,19,20
7910 DATA 12,13,15,16,17,20
7920 DATA 12,13,15,16,18,19
7930 DATA 12,13,15,17,18,20
7940 DATA 12,13,15,17,19,20
7950 DATA 12,14,15,16,17,20
7960 DATA 12,14,15,16,18,19
7970 DATA 12,14,15,17,18,20
7980 DATA 12,14,15,17,19,20
7990 DATA 15,16,17,18,19,20
```



MAKING MISCHIEF WITH MINI-XMOD AND HOT-Z

You just have to admit it: There ARE some rather interesting programs written for the TS1000/ZX81. Although it normally takes a tiny length of extra time to LOAD and SAVE them with standard cassettes, the simplicity of this Z80-based machine leaves itself wide open to software configuration.

One program in particular that just screams out to have someone smooth the rough edges or install additional new subroutines is MINI XMOD 1.5. I choose 1.5 because I know for a fact that the UP/DOWNLOAD function works exactly the way it is supposed to (Version 1.7 does NOT work!). This is a real fun experience to actually see data, as hex, coming into or leaving your CPU. Once you get to playing with this program, however, you begin noticing areas where certain added features could be very helpful, such as a simple word processor. How neat it would be to load in only one program, type your text or load another program into it, edit it, then use this same program to dial up a BBS and upload this fresh data into it!

How can this, or any other mod, be possible? Crack the safe. Rip it open. Stare at and manipulate its innards. Use HOT-Z! First, LOAD in MINI XMOD 1.5. At this point, a modem need not be attached. Depending upon which "copy" you have, you'll either have a BASIC list displayed, or 0/0, in which case you'll have to do your own LIST. MINI XMOD will want a reset RAMTOP, so enter RUN. The main menu will come up telling you to touch any key. Do it. Without a modem, the display at this point will seem very strange. Dark and light horizontal bars will scroll all over the screen. Since the QUIT option is SHIFT/ENTER, do this. It will ask if you want to save files. Respond "N". The program will terminate in a weird error code, but ignore this. Now, erase the BASIC with NEW. Don't worry. With RAMTOP reset, MINI XMOD is still there, eagerly anticipating a RAND USR 31492 to start again (This will vary slightly, depending upon available RAM and modem type, per documentation). But don't do this (you can, if you want, just to give yourself piece of mind that it really is there.). Next, LOAD in HOT-Z. With my particular copy, after the 0/0 report, a GOTO 1 command is necessary to activate HOT-Z. A hex list will be displayed for addresses and contents, plus mnemonics. In the upper left, a hi-lighted area that says "ADDR" is prompting you for the beginning address range you wish to view. Remember MINI XMOD's BASIC? For the 16K Westridge version, it indicates decimal address 31492 to be the starting address. Trouble is, HOT-Z wants a hex input! Now, I don't know about you, but I can't instantly translate 31492 to hex in my head! So push the X key. Now, the hi-lighted prompt says, "ADDRD." With this extra 'place', you can now enter 31492. HOT-Z instantly displays MINI XMOD from hex address 7804! According to MINI XMOD's docs, the actual address range of the MC program goes from 7300h to 7f40h. This works out to be from 29440 to 32576 in decimal. As a strictly comparative exercise, you can RUN a FOR-NEXT loop in BASIC just before loading HOT-Z. Use this loop to print decimal addresses, values and CHR$ of those values to later compare with what HOT-Z will show you. The BASIC loop can look like this:

```
1  LPRINT " ADDR ";" DEC VAL ";"CHR$ "
5  FOR N=29440 TO 32576
10 LPRINT N;"    ";PEEK N;"      ";CHR$
   PEEK N
15 NEXT N
```

The results of this program by the way using a TS2040 or Alphacom 32 printer will use up most of a roll of thermal paper in slightly over a half an hour! Go visit the family, watch some TV or out to the local bar. Don't forget to come back! When done, NEW it for the incoming HOT-Z.

MINI-XMOD cont...

So far, we have HOT-Z monitoring that area above RAMTOP where MINI XMOD 1.5 currently resides. We're looking at a hex listing from 7300h. The biggest thing missing from here is decimal numbers! Pretty hard to compare with that BASIC printout, containing nothing but decimal numbers. Fortunately, an easy out exists. HOT-Z's docs say that a mere push of the K key will change the display to include the missing decimals! This is definitely the way to go. I have a much, much easier time thinking in decimal, than I do in hex. Now, we can visually verify with that humongous roll we just printed out. Since we, at SWYM, are more interested in our readers acquiring results than spending gobs of time working for them, I'll let you in on a secret: The listings match! With this relief, we progress to the next phase. Look for large blocks of NOPS (0). Make notes of where they are and how big. Again, we'll let you cheat by my telling the answers: There's a 47-byte block between 29632 and 29679; a 95-byte block between 29688 and 29783 (check out the 'stranded' 37d at 29760, first) and, finally, a whole 107 bytes at the tail end of its documented range, from 32469 to 32576. I say "documented range" because the actual machine code listing spells out the word "END" from addresses 32466 to 32468. Actually, according to HOT-Z, lots of additional nops are present past the 32576 "limit."

What we have done is to identify areas where additional coding may be written. Since it's likely that new subroutines can't be blindly thrown in, a certain degree of experimentation is required for the user (You didn't think we'd tell everything??). Once you have some possible routines coded per the above sizing specs, go to the area of NOPS you wish to play in and press W for HOT-Z's Write Mode. Use SH/8 (right cursor) to position the position the cursor at the exact nybble you wish to change (up/down arrows also work), then type the hex coding for your routine. When done, hit ENTER to return to read mode. From here, HOT-Z supplies a One-Step execute test. If you really know your code, and where it branches from and to, you can follow it with this. Press V (also accessible by O from write mode) and the display changes to show registers, flags, stacks and anything else your program will affect. A mere press of the ENTER key one-steps you through each instruction. SPACE bypasses it for the next one. Be careful. If you have a real foul instruction, you'll crash yourself! If you're lucky and succeed on the first try. press Q to quit to the read mode or S to the SAVE mode. The SAVE mode will SAVE to tape anything from the cursor position to the user-specified End-of-Program marker. This way, you can save the entire modified Mini Xmod machine code! For those wondering how these two can co-reside in just 16K, remember that Mini Xmod uses a mere 3136 bytes before file initialization (since this is only done for data capture and storage, the program will run fine without doing this) and HOT-Z uses 9.25K of machine-coded REM. Also, don't forget that when initializing a file in Mini Xmod, a huge empty REM statement is generated in the BASIC area. Because of this, it probably wouldn't be a great idea to initialize a Mini Xmod file while also running HOT-Z! We hope that this will give an impetus to experiment with TS1000/ZX81 software. To be able to upload and download with this "doorstop" computer is a great thing to brag about. How much more impressive it would be to say that your lowly, 16K, 8-bit modem program has it's own word processor built in! And don't forget, any workable ideas you come up with should be shared with those TS1000 addicts of SEATUG. Why, we may even put them in SWYM!

Linked Lists & Recursions

DALE FRITZ

BINARY TREE

If you have followed me this far, we come to the reason I wrote the article. A binary tree is an excellent way to store large amounts of alphabetical or numeric data since the functions INSERT (of new data) and LOCATE (of existing data) are so fast. A binary tree of numbers looks like this:

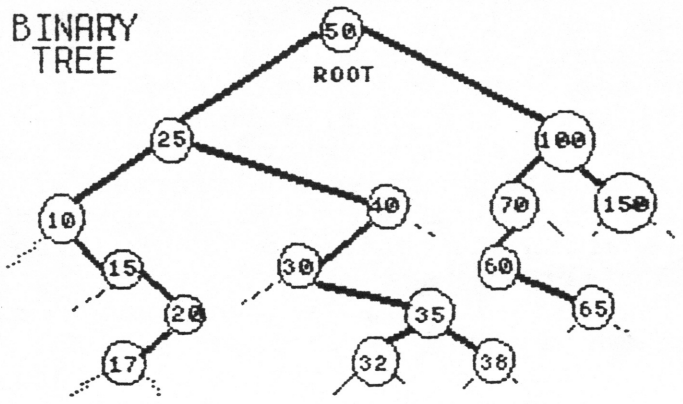


Fig. 3

One number is designated as the root. Ideally, this number would be about the midpoint of all following numbers.

All smaller numbers are to the left of the root, larger to the right. Numbers following the root are called nodes (25,40,100,..are nodes). Numbers at the end of a branch are called leafs (17,32,38,..are leafs.).

To insert a new number, one first decides if it is smaller or larger than the root.(If equal numbers can happen, they are usually sent to the right.) For smaller numbers, one travels down the tree to the left, making a decision at each node to go left or right. To insert 27, one goes left from 50, right at 25, left at 40, left at 30 and presto! a blank spot for 27.

To locate 26, one would travel the same route, looking left at 27 to find a blank. 26 is not in the tree since it could not be located at any other spot. For the function LOCATE, a tree is much faster than a linear search

Remember that trees are not limited to numbers but could easily be names, cities, hobbies,...A computer knows that Carl is less than Mike, at least in the alphabet.

A binary tree can be stored in an array, but one quickly runs out of available memory since space must be available for every possible input. As you may suspect, a binary tree is a natural for a linked list with minimum storage requirements and almost instantaneous INSERT and LOCATE. DELETE is somewhat of a problem, but, in general, one connects the lower part of the tree to the node above-bypassing the deleted node. Through short recursive programs, one can print the tree in several different orders. Three commonly used orders are:

IN ORDER In numerical or alphabetical order.

PRE ORDER, POST ORDER Pre and Post order are used for special searches, restoring an ordered tree for storage, simulating algebraic operations,...

Let's first examine linked list storage for a BASIC binary tree:

max Estimated maximum number of data items.
d(max) Incoming data.
l(max) Left pointer.
r(max) Right pointer.

I	D(I)	L(I)	R(I)
1	50	2	5
2	25	4	3
3	40	6	0
4	10	0	8
5	100	7	9
6	30	0	10
7	70	12	0
8	15	0	11
9	150	0	0
10	35	15	13
11	20	14	0
12	60	0	16
13	38	0	0
14	17	0	0
15	32	0	0
16	65	0	0

For the tree in the sketch above, incoming data could be:
50,25,40,10,100,30,70,15,150, 35,20,60,38,17,32,65.
For the root 50, the left pointer is line item 2 (25) and the right pointer is line item 5 (100). From 100, we can see the left pointer is item 7 (70) and the right pointer is item (150). Item 9 is a leaf since there is no left or right pointers.

LINKED LISTS & RECURSIONS cont.

LOCATE A subroutine for LOCATE with input N, returns with:
Found=1 if N is in the tree.
Found=0 if N is not found.
i is the index of the parent node if N is not found.

```
290 REM ..SR LOCATE..
300 LET Found=0: LET i=1
310 IF d(i)=0 THEN PRINT"Tree is
    empty.": RETURN
320 IF N=d(i) THEN LET Found=1: RETURN
330 IF N>d(i) THEN GO TO 360
335 REM Left side
340 IF l(i)=0 THEN RETURN
350 LET i=l(i): GO TO 320
355 REM Right side
360 IF r(i)=0 THEN RETURN
370 LET i=r(i):GO TO 320
```

To locate 27 in preparation for INSERT, the LOCATE routine would look at (See Fig 4) line 1, line 2, line 3, line 6 and then return with Found=0 and i=6, which would be the node just preceding an insert of 27.

For INSERT, 27 would go on line 17 as a new entry and pointer l(6) is changed to 17.

IN ORDER, I once tried an array representation for a binary tree where a spot is open for every possible entry into the tree (See sketch at left). The problem was to write a subroutine for IN ORDER. After going through page after page, I finally decided that I didn't have the ability to do it.(Actually, I decided that it couldn't be done.) Using recursion with a linked list, IN ORDER can b written in 5 lines. Input is i=1

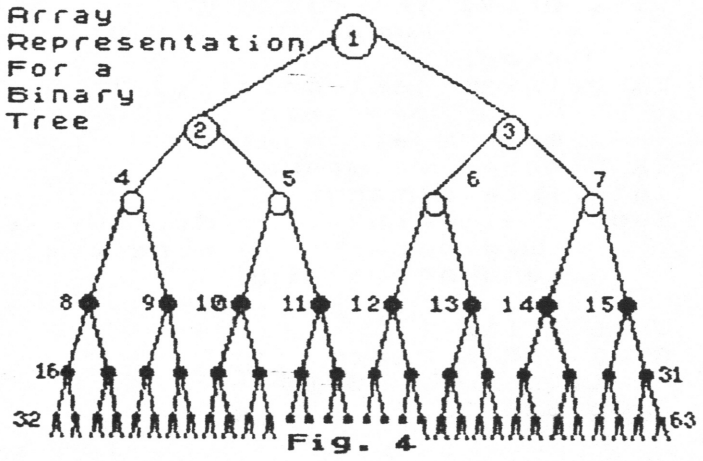


Fig. 4

```
490 REM ..SR IN ORDER..
500 IF d(i)=0 THEN RETURN
510 GOSUB PUSH: LET i=l(i): GOSUB IN
    ORDER
520 GOSUB POP: PRINT d(i);", ";
530 GOSUB PUSH: LET i=r(i): GOSUB IN
    ORDER
540 GOSUB POP: RETURN
```

Follow the routine above for just small branch of the tree in Fig 3. Remember that a RETURN sends you back to the most recent GOSUB (either line 510 or 530). PUSH and POP save and return the index i.

1. The routine walks down the left side, storing the i values for 50, 25, 10, until l(i) of 10 is found as 0.
2. The i for 10 is popped and d(i)=10 is printed.
3. The i for 10 is pushed and the right side is examined.
4. No left side for 15, so d(i)=15 is printed.
5. The right side is examined and a left side is found (ie statements 500, 510 say l(i)<>0)
6. The left side is chased down, l(i)=0 is found and d(i)=17 is printed.
7. With a return from 510, d(i)=20 is printed.
8. The next pop & return prints d(i)=25 and the program continues. For just five lines, the program is busy, busy, busy.

This is recursion at its best. If you would like to examine a binary tree further, the program Binary Tree is in the SEATUG Library. The MENU includes INSERT, DELETE, LOCATE, Print Node List, PRINT Tree, IN ORDER, PRE ORDER, POST ORDER, Form Tree with RND, Form Tree with ENTER. Look for opportunities to use Linked Lists and Recursion in your programming. They can make your program more compact and make BASIC programming more fun.

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